Ontario
Housing
Corporation

ENERGY COST REDUCTION OPPORTUNITIES IN SENIOR CITIZEN LOW-RISE BUILDINGS

ENERGY COST REDUCTION

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SENIOR CITIZEN LOW-RISE BUILDINGS

Prepared for the Ontario Housing Corporation

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A. INTRODUCTION

A. INTRODUCTION

There are approximately 500 low rise senior citizens' apartment buildings within the corporation's inventory.

These senior citizens' buildings require unique attention with respect to energy management because:

- they utilise one source of energy, electricity
- they are built to similar construction standards
- they house a particular sector of the population with special environmental and social needs
- the buildings are typically separated by large distances in rural areas
- technical assistance is normally limited to local residential electrical contractors.

In the past it has not been possible for the Corporation to provide to low rise seniors' buildings the same level of technical support that has been available to high rise buildings.

The purpose of this manual is to provide technical and management guidance to those Housing Authorities who are interested in reducing energy costs in seniors' low-rise buildings. These guidelines should be regarded as an additional management tool, together with the ECRS, Monitor and Target reports, for assisting Housing Managers to incorporate these buildings in their overall energy management programs.

A consistent philosophy of OHC's energy management program has been that useable and timely information precipitates action and develops accountability. The information presented in the following pages that

applies to the Housing Manager is contained in Section B, Management Guidelines, and is underlined in Section C, Cost Reduction Measures.

Technical information that the Maintenance Manager can use directly is contained in Section C, Cost Reduction Measures.

Duties for Custodians and Security Tenants can be found in Section D, Custodian Checklist.

The manual was prepared from technical site visits to several housing project across the province, and from comprehensive interviews with Housing Managers, Maintenance Managers, and Custodians. A team, comprising CHC staff from the Technical Support Branch and engineering and communications consultants, conducted the site visits and interviews. The co-operation and support they received from the housing authorities was instrumental in the preparation of this manual.

B. MANAGEMENT GUIDELINES

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When a sample of 90 buildings (3,098 units) were analysed from across the province, annual energy costs per unit (or suite) were found to vary from a low of $274 to a high of $873. This represents a range of 42% below to 85% above the average of $472 per unit.

When energy efficiency (a measure of energy use relative to building area and weather) was analysed for the 90 buildings, the data did not show any obvious correlation of energy efficiency with building age, building size or number of storeys.

However, the site visits, interviews and analysis conducted during the fall of 1985 revealed that management interest and commitment, with respect to energy cost reduction opportunities in seniors' projects, appeared to relate directly to energy efficiency.

Management, the Housing Manager and Maintenance Manager, have a greater potential influence on energy cost reductions in low-rise seniors projects than in high-rise projects, because the activities leading to saving money in low-rise buildings are more strongly people driven.

The challenges and obstacles in reducing and controlling utility expenditures in low-rise seniors projects have been recognized for some time. They include:

- no incentive for residents to practice good energy habits
- aging, sometimes poorly constructed buildings
- insufficient time to visit dispersed sites spread over large distances
- perceived resident needs (eg. opening a door in winter to see the outside world) conflict with good energy management practice

- no money
- inadequate technical advice or skills to implement and maintain some required changes.

The majority of guidelines in this manual are simple and have been practiced successfully in one or more projects. For example, controlling the opening of windows and outside doors in apartments and common areas in winter is one of the most effective energy conservation measures that can be undertaken. It is also one that is impossible to accomplish without the co-operation of the custodian. For this measure and many others a section of this manual has been devoted exclusively to assist the custodian in his essential role in controlling energy cost expenditures.

Sections of the manual which are important to housing managers are underlined to be readily picked out from the body of information provided.

One important cost saving measured is included although it does not result in energy savings. It is an example of how management attention to understanding utility costs can pay off. By converting from flat rate billings to water meters as much as $70/suite/year can be saved.

2.1 KNOW YOUR OWN COSTS

From the data supplied by Technical Support Branch (ECRS, Target, and Monitor reports) check how the energy cost per unit compares:

- between projects within your Authority
- to neighbouring Authorities.

Try to rationalise differences by reviewing with your Maintenance Manager why these differences occur. Section 3 will help identify measures you may not have already considered.

Decide what priority you can afford to give to implementing and monitoring energy cost reduction activities.

2.2 INTERNAL COMMUNICATION

Some Authorities include an update on their energy cost situation as an agenda item in their semi-annual maintenance seminars. The Housing Manager often provides the update in person to re-inforce its importance and solicit feedback from maintenance personnel. Another advantage of using this forum is that energy management is not viewed as an isolated issue but rather integral to the responsibilities and duties of staff.

Managing seniors' buildings requires an interest in much more than the buildings. The residents' comfort and special needs are integral components of staff activities. When energy management can be genuinely appreciated as not being in conflict with resident needs, a team approach between the Housing Manager, Maintenance Manager, Custodian and residents has been observed to develop. For example, patient and persistent attention to closing windows in winter, and to explaining and re-inforcing to residents the reasons why, has reaped rewards not only from this specific activity, but also from other similar measures requiring tenant co-operation.

2.3 SUITE TEMPERATURES

Authorities, such as Canada Housing and Mortgage Corporation and Health and Welfare Canada recommend that suite temperatures during the heating season be maintained at 24 C (75 F) in senior citizens' apartments. It is suggested that Housing Managers consider this as a suitable temperature to adopt on the understanding that this is a suggested temperature not a standard mandatory temperature.

Improved heating controls and draft reduction programs allow lower space temperatures to be maintained in buildings without loss of comfort.

2.4 COMMUNICATING WITH RESIDENTS

Communication with residents varies from mailing letters exhorting more concern over energy wasting habits, to monitoring and responding to complaint levels after introducing a change in building operation.

Success appears to be associated with the nature and extent of the custodian-resident interaction. It would appear that resident behaviour with respect to energy use can be modified if the custodian has a basic desire to see that measures requested by the Maintenance Manager are implemented whilst the needs of the residents are acknowledged. For example, corridor temperatures have been permanently reduced below those in suites together with controlled introduction of make-up air during cooking hours by the persistent yet reasonable attitude and actions of a dedicated custodian.

With management support and patience, the custodian can deal successfully with the majority of resident-originated apprehensions concerning building operational changes.

C. COST REDUCTION MEASURES

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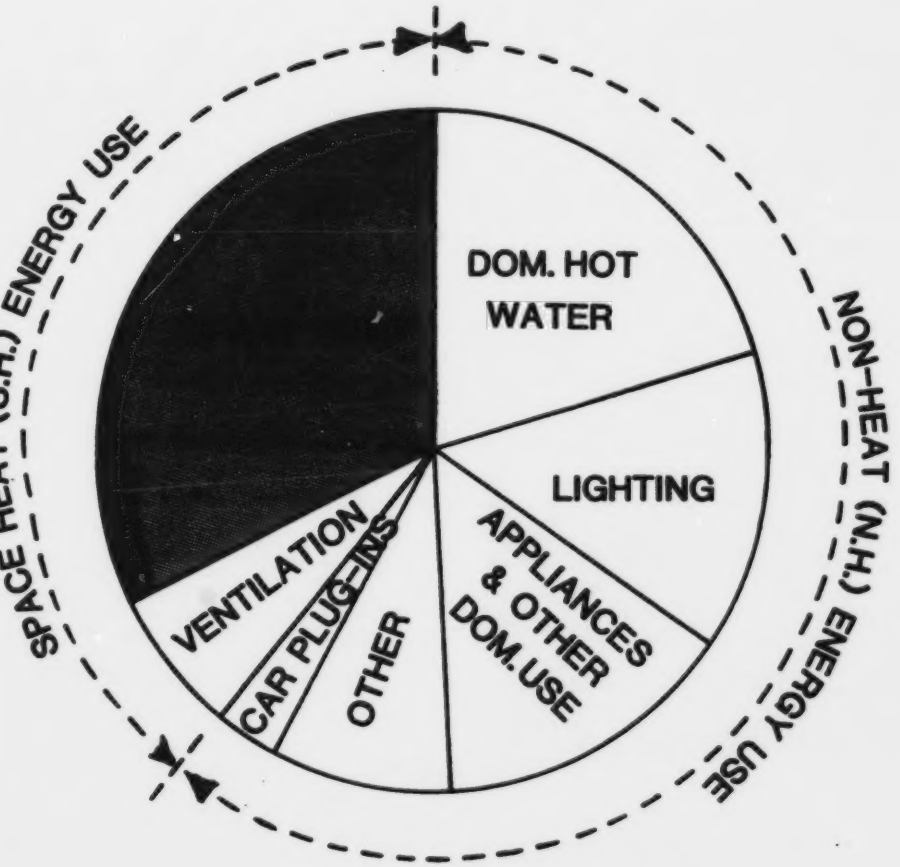
The manual presents a compendium of energy management measures which apply to this building stock. The measures are organized according to the building systems to which they relate. The relative magnitudes of energy use for the major systems of a typical low-rise building are shown below.



It must be recognized that this is the breakdown for an average building. The sizes of the components can vary considerably between different buildings, depending upon the nature of its energy use inefficiencies.

Each of the twenty-nine measures is presented to help the reader zero in on those which are most likely to be the winners in a particular building. the "Where It Applies" section defines those buildings to which the measure may be relevant. This is followed by a description of the measure which also identifies conditions which make it particularly beneficial if the measure passes these qualification tests, then the reader is guided in determining its economics and in getting it done. Reference is also made to previous OHC guidelines and specifications on the same subject.

Information which is of particular interest to the senior management of the housing authorities is underlined so that it is readily identifiable during quick reading of the manual.

1.0 BUILDING ENVELOPE

1.1 KEEP WINDOWS AND DOORS CLOSED

Where it Applies

Controlling the opening of windows and outside doors in apartments and common areas in winter is by far the most important and most effective energy conservation measure for all of our low-rise building stock.

Description

Keeping windows and doors closed in winter is essentially a management issue. It requires continuous attention from the housing authority. It needs the commitment of the authority to knock on doors and to send written reminders to residents on a regular basis. It will never be entirely successful—there will always be a few people who will not cooperate. However, the observed differences are considerable between the buildings of housing authorities which have active tenant awareness programs and those which do not.

The discipline of walking around the buildings and recording open windows and doors should be instilled in the custodians, and in the housing authority staff who visit the buildings. Custodians should conduct these inspections once a week in winter. The records should be kept as a measure of the effectiveness of the awareness program. Tenants should be regularly reminded that leaving one of the two sliders open doubles the heat loss through the window, while providing little or no extra ventilation.

The custodian should be instructed to close common area windows wherever they are found open. He or she should be trained to notice when

one slider is open, and to report broken window and door hardware and weatherstripping. In some cases it may be desirable to screw wooden stops into the runners to prevent sliders from being opened in winter. In all cases, the custodian should arrange a late evening tour of the building to ensure that all common area windows are shut overnight.

Cost/Benefit

There is little or no expenditure of money required for this measure. All that is necessary is the time to set up effective procedures, and the commitment to keep them in place. Energy cost savings can be in the range of 5-10 percent of total annual energy use, or more in some cases.

1.2 INSULATE AND SEAL ATTICS

Where It Applies

This measure applies primarily to buildings with pitched roofs and ventilated attic spaces. Even if an attic has already been insulated, it is possible that air sealing work should still be done.

Description

Buildings lose heat to their attics in two ways. The first is conduction of heat through the ceiling. This heat loss is reduced by placing insulation on top of the ceiling. Most of our buildings already have good attic insulation. If a building has less than 6 inches of fibreglass or cellulose insulation in the attic, then it should be brought at least up to a level of R-34.

The second form of heat loss is the leakage of warm building air through the ceiling into the attic. This energy loss can be substantial, and can lead to potentially serious roof and attic problems, which are aggravated by the addition of attic insulation. The air entering the attic from the building is humid. As it passes through the insulation, condensation makes the insulation wet. In very cold weather, the moisture freezes, leading to ice buildup in the attic. The conventional solution to this problem is to increase the rate of attic ventilation. The more effective solution, which also reduces heating energy use, is to seal the penetrations through the ceiling - party walls, plumbing stacks, ventilation ducts and lighting fixtures. Attic hatches should be insulated and weatherstripped, and the junction between the frame and the ceiling should be caulked.

Serious air leakage problems can be identified from moisture and ice buildup in the attic, and from patterns on the roof after snowfalls.

Correction of these problems is necessary to reduce energy costs and to preserve the roof. It should also be recognized that the air escaping from the building into the attic is replaced by outside air infiltrating the building around windows and doors. Sealing the attic leads to reduced drafts and discomfort in the building.

Cost/Benefit

The cost of air sealing for the attic is typically between $150-$200/unit, depending on the size of the building, the access to the attic, and the travelling expenses of the contractor. Energy savings of 2.5%-5% would be expected, providing paybacks of 4-10 years. Costs and paybacks are reduced if several buildings are contracted together, and if weatherstripping for walls, windows and doors is undertaken at the same time (see 1.3).

How to Get It Done

Air sealing contractors are found in the Yellow Pages of most urban centres under Insulation. Air sealing is specialized work, and references should always be checked. Most contractors are willing to travel to remote locations. Proposals should specify the work included, the approach taken and materials to be used.

1.3 SEAL WALLS, DOORS AND WINDOWS

Where It Applies

Caulking and weatherstripping of walls, doors and windows applies to all buildings. Where buildings are particularly exposed to the elements, or have histories of serious discomfort due to drafts, air sealing is likely to be particularly effective in reducing energy costs and improving comfort conditions.

Description

Caulking and weatherstripping measures which are particularly effective in low-rise buildings are as follows:

- Sealing windows - use V-strip on sashless and sashed windows; replace fin seal on sash windows; caulk the inside of the junction between the wall and the window frame and sill.
- Sealing exterior doors - use V-strip or Foam Guard on doors and frames; install fin-seal residential door sweeps; caulk the inside of the junction between the wall and the door frame.
- Sealing wall/floor joint - remove baseboard and seal the wall/floor junction on exterior walls.
- Draftproofing electrical outlets - install draftproofing material behind the backplate of outlets on exterior walls.

Cost/Benefit

The total cost of caulking and weatherstripping a building by an air sealing contractor is in the range of $350-$500/unit. This includes walls, windows and doors, and insulation and weatherstripping the attic (see 1.2). Energy savings of 5%-10% are expected, providing paybacks of 5-15 years.

Alternatively, some materials can be purchased and applied by building staff or by local labour. Anticipated costs and payback periods are thereby reduced by at least half.

How to Get It Done

Air sealing contractors are found in the Yellow Pages of most urban centres under Insulation. Materials, for installation by building staff or local labour can be recommended by regional housing offices.

1.4 REPLACEMENT WINDOWS

Where It Applies

Most of our buildings are double glazed. The thermal performances of the different types of windows that have been used over the years vary widely in terms of air sealing and of resistance to conduction heat losses. Sashless sliding windows, which were used extensively in buildings constructed before 1978, are particularly poor at resisting air infiltration.

However, the capital costs of replacing windows are too great to be justified by energy cost savings alone. Rather, energy cost savings are a bonus to be obtained when changing windows because of failure of existing units.

Description

The replacement of windows is a major capital expenditure with a number of alternative approaches. Assistance with selection and specification of the work should be obtained from the regional office.

Cost/Benefit

Replacement of windows can save between $2-$10 per square metre of window area, depending on the condition of the existing windows. The cost of replacing the windows typically ranges from $200-$250 per square metre.

1.5 UPGRADE STORM DOORS

Where It Applies

In a number of buildings with balconies, it has been found that some tenants leave the wooden or metal insulated balcony door open so that they can see out through the storm door. This practice should be discouraged. Where it persists, the storm door should be as resistant as possible to heat loss. This measure applies when installing or replacing storm doors, and also relates to ongoing maintenance of weatherstripping.

Description

When the balcony door is open, the only resistance to heat loss is the uninsulated, single glazed storm door. It is not cost justified at this time to replace the storm door with a double glazed insulated unit. The recommended energy management strategy is to minimize air leakage by selecting a robust (32mm thick) door with good weatherstripping and a well fitted weathered door sweep as detailed in Section C.8.1.1 of the Family Housing Specification Guide.

Cost/Benefit

The costs and energy cost savings associated with weatherstripping the storm doors are included in Measure 1.3 - Seal Walls, Doors and Windows. The measure is given separate coverage here because of its importance in situations where open balcony doors in winter are prevalent.

1.6 INSULATE CRAWL SPACES

Where It Applies

Buildings which have uninsulated crawl spaces beneath the ground floor should be considered for addition of insulation.

Description

Penetrations through the ground floor by pipes, wiring and ventilation ducts should be properly sealed before insulation is applied. The insulation provides a warmer ground floor, which improves comfort as well as saving energy.

Cost/Benefit

Insulation of crawl spaces normally costs $5,000 or more, depending on the area to be insulated and the ease of access. Payback periods are estimated to be 8-12 years. The assistance of the regional office should be obtained for preparing the budget and specifying the work.

1.7 INSULATE WALLS

Where It Applies

The wall insulation standards in our low-rise building stock range from adequate to good. Reinsulation is technically difficult and not cost justifiable.

Where local cold spots occur, which cause condensation, mildew and damage to interior finishes, insulation and air sealing are generally the best solutions. When exterior cladding is being applied due to failure of the outside wall of the building, insulated panels should be used.

As with other measures designed to upgrade the thermal performance of the building envelope, wall insulation can improve comfort as well as lowering energy costs.

Description

Most local cold spots in exterior walls occur around window and door frames, and close to the attic. These are generally due to air leakage, and should be remedied by the air sealing work described in Section 1.1. Where cold spots are found in other areas, creative solutions to applying insulation are often necessary. Insulation solutions should always be tried before increasing ventilation rates to control recurring condensation problems.

Applying exterior cladding to a building brings about a major change to the overall behaviour of the building envelope. Such work must be approached carefully, with the guidance of a registered architect, and with due consideration of consequential modifications which need to be made to the building's heating and ventilation systems.

Cost/Benefit

Effective insulation of cold spots will normally provide payback periods of 3-6 years. More importantly, it can avoid the high energy costs of increasing ventilation rates to cure condensation problems.

The energy cost savings potential of insulated cladding on a building is highly variable, depending on the insulation standard and the resistance to infiltration of the existing building envelope. Energy savings of up to 20% may be expected, with the incremental cost of insulation and effective air sealing in the new cladding being recovered several times over the life of the building.

2.0 VENTILATION

Fresh air required for residents comes from mechanical ventilation systems, and from leakage of outside air through the building envelope. In most buildings air leakage is sufficient to provide a comfortable, healthy building environment. Mechanical ventilation is needed only to control odours, and the energy management measures described below allow this function to be performed for the lowest energy cost.

However, a few buildings have "tight" building envelopes which do not provide adequate natural ventilation. One indicator of inadequate fresh air is high humidity, which shows up as condensation in winter on outside walls and windows.

Isolated areas of condensation are generally the result of cold spots in the building envelope rather than inadequate ventilation, and should be corrected by reinsulation and air sealing as described in section 1 of the manual. Should more general condensation occur, consult the regional office to obtain professional assistance in diagnosing and correcting the problem.

2.1 REDUCE CORRIDOR FAN OPERATION

Where It Applies

This measure applies in winter to buildings which have heated corridor makeup air systems.

Description

The function of the corridor ventilation fans is to pressurize corridors, thereby restricting the migration of cooking odours from the apartments. Operation of these systems consumes considerable amounts of energy. If the fan runs continuously, the energy cost will be between $100-$200/apartment/year. The fans need only to operate during cooking periods. Most housing authorities are now operating their corridor fans for 6 hours/day or less, typically 2 hours in the morning, 2 hours at lunchtime and 2 hours in the evening.

This control is accomplished with mechanical or electronic programmable timeclocks. Twenty-four hour timeclocks are preferred, since their dials are large enough to permit three on-off cycles per day. The timeclocks must be inspected on a regular basis, weekly in winter, to ensure that they read the correct time and that the dogs are in the correct position. It is advisable to post a notice beside the timeclock stating its function, its required set points, and the need to check it regularly. For electronic timeclocks instructions on how to review the program should be posted.

When the fan is not running, the corridor ventilation ducting provides a direct connection between the corridor and the outdoors. Through this connection, warm building air can escape, and cold outside air can enter the corridors. In some buildings the corridor fans have been found running continuously because of cold drafts from the supply grilles when

the fans are off. It is important to have a good quality automatic damper installed in the system to close when the fan shuts down. Ideally the damper should be upstream of the ventilation unit. It must be inspected regularly (at least once a year) to ensure that it closes properly. An access door should be fitted to allow this inspection.

Modified controls should also provide for shutting the unit down altogether in very cold weather (below -12 C or 10 F).

Cost/Benefit

The cost of installing a timeclock and an automatic damper on one system is normally less than $1,000. The payback period is generally one year or less.

How To Get It Done

This work can usually be done by a local mechanical contractor. A standard specification is available from the regional office.

Note: In summer, with the heaters shut off, the corridor ventilation fan should be run to your best advantage - up to 24 hours/day.

2.2 REDUCE CORRIDOR FAN AIRFLOWS

Where It Applies

This measure applies to buildings which have heated corridor makeup air systems. It is particularly relevant to buildings which have inadequate heating capacity in the corridor makeup system in very cold weather.

Description

A wide range of installed airflow capacities per suite have been found in different buildings, ranging from a low of about 30 cfm/suite to a high of well over 100 cfm/suite. With operating periods of 6 hours/day, the difference in annual energy costs for these two extremes is close to $50/suite/year. If the installed air supply is greater than 50 cfm/suite, it should be reduced to 30-40 cfm/suite.

There are two ways to determine the airflow capacity of a ventilation unit. The first is to use data obtained directly from the nameplate, from the documentation provided with the unit, or by supplying the make and model number to the manufacturer. If these sources prove fruitless, then a good estimate can be made by assuming that the heaters are sized for the conventional 55 C (100 F) temperature increase of the incoming air. In this case, have an electrician ensure that all heaters are working and measure the total capacity in kiloWatts. Multiplying the number of kiloWatts by 35 cfm/kiloWatt determines the approximate installed airflow.

If the motor in the unit has an adjustable pulley, then some airflow reduction can be obtained by opening the pulley and then sliding the motor back to keep the belt tight. The fan speed (rpm) should be measured before and after the adjustment. The airflow reduction is directly proportional to the reduction in fan speed - a 20 percent reduction in fan

speed reduces the airflow by 20%.

If sufficient reduction cannot be made by pulley adjustment, then a smaller motor pulley should be installed. If this is not enough, then a larger fan pulley is required. Fan speed is directly proportional to pulley diameter - a thirty percent airflow reduction requires a 30 percent smaller motor pulley or a 30 percent larger fan pulley.

The airflow reduction should generally be no more than 40 percent to avoid fan performance problems. Heating elements should be disabled in the same proportion as the airflow reduction. If the airflow is reduced by 30 percent or more, it may be necessary to install a baffle plate over the disconnected heating elements to maintain the air velocity over the active ones. The manufacturer can provide advice on this matter.

Cost/Benefit

Adjusting a pulley to reduce airflow will cost less than $100. If replacement pulleys are required, the cost may rise to $500. If heating elements are to be disconnected and a baffle plate installed, the total cost may reach $1,000. Payback periods range from less than one year to three years.

How To Get It Done

This measure can be implemented by a mechanical contractor.

2.3 REDUCE EXHAUST FAN OPERATION

Where It Applies

An exhaust fan running in winter removes warm air from the building. When the corridor fan is running, operation of the exhaust fan reduces the effectiveness of the corridor pressurization. When the corridor fan is off, the exhaust fan draws in outside air around windows and doors which increases the load on the building heating system. This measure applies to just about all of our low-rise building stock, and relates to all exhaust fans except in suite bathroom and kitchen fans which are operated as needed by residents.

Description

The following areas may be equipped with exhaust fans:

- laundry rooms
- hot water tank rooms
- apartment bathrooms and/or kitchens on central system
- electrical rooms
- meeting and games rooms

A single fan running continuously for a year can cost $200-$1,000 in heating energy. It is important to minimize exhaust fan operating periods.

Some exhaust fans, such as those in games rooms, are installed primarily to avoid overheating in summer, and may be shut down altogether in winter. When the fans are off, shutters or dampers should close to prevent cold air from entering the building through the fan casing. If the shutters or dampers are not effective in preventing infiltration, a removable cover should be installed to be closed in winter.

Other exhaust fans, such as those in laundry rooms, are required only during occupied periods. Their operation should be regulated by a timeclock, or by a timeswitch which allows users to select a fan operating period up to 2 hours. Shutters or dampers, to close when the fans are off, should be adjusted, gasketted, replaced or installed as necessary.

The third category of exhaust fans is those which are needed year round to prevent overheating. This category includes fans in electrical rooms. Thermostats are required to operate these fans for only as long as necessary. The thermostats are normally set for 30 C (86 F) to keep the fans off for as long as possible.

In all cases, permanent notices should be installed beside switches and controls to describe the functions of and areas served by the fans, and to state the required setpoints and operating procedures.

Cost/Benefit

The cost of the work necessary to reduce exhaust fan operation can range from $100-$500. Payback periods are normally between 6 months and 2 years..

How To Get It Done

Timeclocks, timeswitches and thermostats are installed by electricians. A mechanical contractor will be needed for work on backdraft dampers and covers.

2.4 REFURBISH OR REPLACE APARTMENT EXHAUST FAN SHUTTERS

Where It Applies

This measure applies to all buildings which have individual in suite exhaust fans for bathrooms and/or kitchens.

Description

The shutter is a gravity operated device which is blown open by the exhaust fan and swings shut when the fan stops, preventing outside air from entering the building through the exhaust duct and fan. The shutter is normally installed at the end of the exhaust duct where it passes through the wall or the roof.

If the shutter fails to close properly in winter, cold outside air can blow back through the fan causing cold drafts and increased heating costs.

The shutters should be inspected. There are a number of possible causes of shutters not closing:

- installed upside down
- installed back to front
- casing distorted
- obstruction in duct

Any such problems that are discovered should be rectified so that the shutters swing freely. Shutters which are beyond repair should be replaced with good quality hinged metal units.

Cost Benefit

The cost of inspecting and servicing the exhaust fan shutters for a building should be under $10 per unit. Replacement shutters cost $20 or

less. The payback period for a program of servicing, repair and replacement is estimated to be 3-5 years.

How To Get It Done

A building maintenance contractor can do this work.

3.0 SPACE HEATING

3.1 SEASONAL SHUTDOWN OF COMMON AREA HEATERS

Where It Applies

This measure applies to electric heaters in corridors, stairwells and other common areas.

Description

Electric heaters at the perimeter of the building in apartments and common rooms should all be switched on at the breaker panels throughout the heating season. Their thermostats then cycle the individual heaters on and off as necessary to maintain required space temperatures.

Heaters are generally also provided in corridors, stairwells, equipment rooms, laundry rooms and other common areas. Many of these heaters are only necessary in very cold weather. In these cases, they may be switched on later and off sooner than the apartment heaters.

The need for individual heaters as a function of outdoor temperature is best determined by trial and error. First it is necessary to label the panels to indicate which breaker serves which heater. Candidate heaters are then left off until as late into the fall as possible. When the common areas become noticeably cool, note the date and the outdoor temperature, then switch on some of the heaters - as few as possible to maintain comfortable conditions. Repeat the process when the first group of heaters is unable to hold the required indoor temperature,again noting the date and the outdoor conditions as each additional group of heaters is switched on.

By the time the coldest weather arrives, it is likely that some heaters will still not be required. These heaters were always surplus to

the needs of the building. They should be permanently switched off, and should possibly be disconnected and removed.

Then mark the breaker panels to indicate when individual heaters should be switched on and off. Colour coding can be helpful, and the following is an illustrative example for a typical two storey building.

Colour Code	Areas Served	Needed Below	Month On	Month Off
Yellow	Meeting Room, Games Room	15 C (59 F)	Sept.	May
Red	Laundry Room, Lower Stairwell	5 C (41 F)	Oct.	April
Green	Lower Corridor (half of heaters)	Ø C (32 F)	Nov.	April
Blue	Lower Corridor (half of heaters) Upper Corridor (half of heaters)	-5 C (23 F)	Dec.	March
Disconnect	Upper Corridor (half of heaters) Mechanical Rooms, Upper Stairwell	-	-	-

Cost/Benefit

The only expenditure required for this measure is the small possible cost of removing some heaters and refinishing the walls. Savings can be up to 5 percent of total electricity costs.

How To Get It Done

The building custodian should be helped in establishing which heater is on which breaker, and should then be trained to determine when heaters should be switched on and off, and to mark up the breaker panels accordingly. Seasonal switching of the common area heaters must then become part of the operational routine for the building.

3.2 INSTALL TEMPERATURE LIMITING THERMOSTATS

Where It Applies

Temperature limiting thermostats prevent residents from raising temperature settings above predetermined limits. They potentially apply to all electric heaters, with resultant electricity cost savings being dependent upon the current degree of overheating.

Description

Limiting the space temperatures in different parts of the building to no more than comfortable levels reduces heat losses through the building envelope, and makes tenants less inclined to open windows and balcony doors. This can provide considerable electricity cost savings. Thermostats can be replaced on a selective basis; apartments housing elderly people who genuinely need higher temperatures can be left alone, while the suites of tenants who are known to set their thermostats too high without good reason will be retrofitted first.

Cost/Benefit

The cost of installing a new limiting thermostat on an electric heater is typically about $25. Resultant electricity cost savings may be expected to provide a payback period of 1-5 years, depending on the current degree of overheating.

How To Get It Done

An electrician will install the new temperature limiting thermostats. The following units are recommended:

Apartments:

- 110V-220V Honeywell T-498A1794
- 24V (round) Honeywell T86A-3089 (backplate may be required)

- o 24V (rectangular) White-Rogers IE30-366

Hallways:

- o 24V Accustat (68 F temperature sensor or 20 C)

Stairwells & Entrances:

- o Set thermostat to minimum heat and remove knob
- o Drill out the knob centre, and reinstall knob.

3.3 INSTALL NIGHT SETBACK THERMOSTATS

Where It Applies

Night setback thermostats are used in rooms which are unoccupied at night. To justify the cost of a thermostat, at least 5 kiloWatts of heat must be controlled by it.

Description

Reducing space temperature in the building is one of the most effective energy management measures. If certain areas, such as meeting rooms, lounges and hobby rooms, are not in use at night, then the space temperatures may be further reduced during the unoccupied periods.

The night setback thermostat replaces the existing thermostat. It consists of a controller with a night setpoint and a daytime setpoint, and a timeclock to switch between the two.

It takes time for the building to cool down at night, and to warm up again in the morning. In mild weather the timeclock should be set to switch to the setback temperature 2 hours before the room becomes unoccupied, and to switch back to the daytime temperature 1/2 hour before the occupied period begins. In cold weather, these lead and lag periods should be reversed, providing a 1/2 hour cool down and a 2 hour warmup period.

If setback thermostats are installed in more than one area of a building which pays monthly peak billing demand charges, then the timeclocks should be set to return to occupied temperatures 1 hour apart in mild weather and 2 hours apart in cold weather. The purpose of this strategy is to avoid, or at least to minimize any increase in billing demand costs due to setback. The warmup time settings must also be

coordinated with the startup time of the domestic hot water recirculation pump, as described in Measure 4.4. Depending on the recovery capacity of the heaters, it may also be found necessary to maintain a higher setback temperature in cold weather.

Ideal temperature and time settings should be established by trial and error. The following settings are typical:

	Occupied		Unoccupied	
	Temp. C	Time	Temp. C	Time
Mild Weather	24 (75 F)	7:30am	15 (59 F)	8:00pm
Cold Weather	24 (75 F)	6:00am	18 (64 F)	9:30pm

Cost/Benefit

The installed cost of a setback thermostat is between $100-$150. The payback period for 5kW of installed heat is approximately 5 years.

How To Get It Done

An electrician will install the setback thermostat. The recommended unit is the Honeywell T8082A - Chronotherm Fuel Saver Thermostat with metal enclosure.

4.0 DOMESTIC HOT WATER

4.1 Lower Water Temperature

Where It Applies

Keeping the domestic hot water temperature as low as possible applies to all of the buildings.

Description

Reducing the hot water temperature saves electricity in two ways. Firstly, it provides a direct reduction in the energy used to heat hot water which is used untempered for such purposes as rinsing dishes, laundry and shaving, or which is lost through leaking taps. In a senior citizens' building, these uses may account for up to 30 percent of hot water consumption. The rest of the hot water use is tempered with cold water in baths and showers, and a reduction in water temperature simply leads to more hot water consumption to obtain the required mix temperature, with little or no saving in heating energy use.

The second source of energy savings is the reduction in heat losses from the hot water distribution pipework caused by the lower hot water temperature. Recirculation pumps are provided on most of the systems to ensure that hot water is always immediately available at the taps. As a result, the pipework is always hot, and the electricity used to make up the heat losses is believed to account for up to 50 percent of the total energy used by the domestic hot water system. A 5 C (10 F) reduction in hot water temperature reduces these losses by approximately 20 percent.

All systems should be equipped with an accurate thermometer in the domestic hot water supply pipe. The water temperature should be reduced to 50 C (120 F). If this temperature leads to complaints, the custodian checks the water temperature at the tap, which should be at least 40 C

(104 F). If this temperature is not available, the custodian records the apartment number, the date, the time of measurement and the actual water temperatures in the supply pipe and at the tap. If inadequate water temperatures occur only during peak demand periods, the hot water heaters should be ckecked to ensure that all elements are functioning. If repair of elements does not cure the problem, then the water temperature is raised to provide 40 C (104 F) or hotter water at all taps.

If the 50 C (122 F) setting at the tank provides better than 40 C (104 F) hot water at all taps, reduce the setting to 45 C (113 F). The hot water temperature should not be lowered any more than this. Note that tank thermostats should be set 1 C (2 F) apart to avoid excessive heater cycling.

Cost/Benefit

Savings of up to 5 percent of total electricity costs can be obtained from reducing the hot water temperature. The only costs are for installing or replacing the supply temperature thermometer, and for an electrician's time to adjust the hot water temperature, and perhaps to repair broken heating elements.

How to Get It Done

The water temperature controls are generally behind the access panels on the storage heaters, and an electrician should make the necessary adjustments. If the controls are exposed, the custodian can adjust the water temperature.

4.2 Insulate Pipes

Where It Applies

This measure applies to all buildings which have accessible sections of uninsulated domestic hot water supply or recirculation pipework.

Description

Thermal insulation reduces the rate of heat loss from the distribution pipework. All heat losses have to be replaced, and recirculation pipes as well as supply pipes should always be insulated.

The addition of insulation can have a compound effect on energy use. The reduction in heat loss leads to a smaller drop in water temperature between the tank and remote apartments, which may allow the water temperature setting at the tanks to be lowered. The average water temperature in the system is thereby reduced, which further cuts system heat losses.

There can also be further benefits. In a number of buildings, uninsulated hot water pipes in the tank room cause overheating, and the exhaust fan is run in winter to maintain comfortable conditions in the room. Adding insulation stops the overheating and allows the exhaust fan to be shut down in winter, and the resultant ventilation energy savings add materially to the savings due to the pipe insulation.

Cost/Benefit

Unless there are very long sections of accessible uninsulated pipework, the cost of pipe insulation is generally less than $1,000. The payback period is typically 1-3 years.

How to Get It Done

For small sections of pipe insulation, the materials can be purchased from hardware stores and installed by the custodian. If the work is more extensive, it should be contracted out.

4.3 Shut Down Redundant Tanks

Where It Applies

This measure applies to buildings which pay peak electrical demand charges, and have four or more electric hot water storage heaters.

Description

Since domestic hot water heaters are generally independently controlled, it is likely that they will all come on together at least once during a billing period. If the building is subject to billing demand charges, this simultaneous operation of the heaters adds to the electricity cost. Switching off one or more heaters prevents their operation during peak demand periods.

If there are only three storage heaters or less in the building, it is unlikely to be possible to shut one down. However, if there are four or more heaters, there is a very real possibility that at least one is redundant and can be permanently shut down.

This measure must not be taken at the expense of maintaining a higher storage temperature. Measure 2.1, reduction of water temperature, should always be implemented first. Tanks may then be shut down until the heaters remaining in service can no longer maintain required hot water temperatures during peak periods. Note that, because of colder incoming water in winter, it is possible that some heaters may be shut down only in summer. Introduction of an operational practice of seasonal shutdown and startup of storage heaters provides the opportunity to rotate their use, thereby evening out wear and tear, and extending the overall life of the equipment.

The most common piping arrangement for storage heaters provides for splitting the water flow, running it in parallel through the heaters and joining the pipes together again downstream of the heaters. Tanks which are shut down in this parallel flow arrangement should also be valved off to prevent unheated water from passing through them, mixing with the heated water from the active tanks and lowering the system supply temperature.

Shutting down some tanks undoubtedly affects the flow of water through the tanks left in service. However, the effect is likely to be an increase in flow which should not have any negative effect on the operation or service life of the heaters.

Cost/Benefit

There is no cost for implementing this measure. Savings can be up to $1,000/year.

How to Get It Done

With proper instruction, it should be possible for the custodian to shut down the heaters and close the valves. Keep in mind the need to fully implement Measure 2.1, water temperature reduction, before attempting any tank shutdown.

4.4 Cycle Hot Water Recirculation Pump

Where It Applies

This measure applies to all buildings which have recirculation pumps on the domestic hot water systems. It is particularly relevant to buildings which have inaccessible uninsulated pipework.

Description

The recirculation pump keeps hot water flowing through the domestic hot water system so that it is always immediately available at the taps throughout the building. As a result, the pipework remains hot, and considerable heat losses occur, even where the pipes are insulated. Heat losses from distribution pipework account for up to one half of the total electricity used by the hot water tanks.

Stopping the recirculation pump for periods of time can substantially reduce these heat losses. The pump can normally be shut down for 6 hours/day - typically 11 pm - 5 am.

It should be borne in mind that the hot water in the pipes takes time to cool down. Water hot enough for most purposes can still be drawn from the system for up to one hour following pump shutdown, while the water temperature will be adequate for handwashing for most of the pump shutdown period.

If a resident does require hot water while the pump is off, the tap will run until the volume of cooled down water has been drawn from the system. There is therefore a risk that savings from this measure will be eroded due to the energy and water lost by discharging warm water down the drain. This generally does not happen to any serious degree, and the effect is normally insignificant in buildings with flat rate billing for

water consumption. However, if noticeable increases in water use are observed, the pump shutdown period should be shortened, and the possibility of one or more 15 minute on cycles during the shutdown period should be considered. A timeclock should be used which is capable of such cycling.

Cost/Benefit

The cost of installing the timeclock has a payback period of much less than one year. Energy savings of up to 5 percent may be expected.

How to Get It Done

An electrician is needed to install the timeclock. The custodian should be instructed to check the timeclock periodically to ensure that it is reading the correct time and that the dogs are in the proper positions.

4.5 Modify Laundry Washers

Where It Applies

This measure applies to buildings with central laundry facilities which have washing machines using warm water in their rinse cycles.

Description

The flows of hot and cold water into an automatic washing machine are regulated by solenoid valves in the supply lines controlled by the machine's timer. Most machines use a mixture of hot and cold water for the rinse cycle.

A minor modification can be made to the wiring of many machines such that only cold water is used for rinsing.

Cost/Benefit

Energy cost savings of 1-2 percent of total annual electricity costs may be expected from this measure, with a payback period of about 1 year.

How to Get It Done

If the washing machines are rented, or are on a service contract, the contractor should be asked to make the necessary modifications to the timeswitches. If the machines are owned, then a local appliance service company or electrician should do the work.

4.6 Replace Tap Washers

Where It Applies

Replacement of tap washers on a regular basis is an important maintenance function which applies to all buildings.

Description

A dripping tap can waste up to 1 gallon of hot water per hour. If left unattended, this will add up to more than $100/year in water and electricity costs. The problem of dripping taps can be serious in seniors' buildings where many residents are not strong enough to close a tap tightly.

Tenants should be encouraged to report leaking taps, and repairs should be made promptly. Posting reminder notices twice a year helps to jog memories in this regard.

Cost/Benefit

A program to replace leaking water taps and toilet tanks can reduce total water and electricity costs for a building by 1-5 percent of total annual electricity costs. The payback period is normally a matter of weeks.

How to Get It Done

The preparation and posting of reminder notices for tenants is best arranged and scheduled by the local housing authority. Washer replacement may be performed by the custodian or by an outside contractor.

4.7 Convert to Gas Heat

Where It Applies

Conversion from electric to gas heat for domestic water heating should be considered where the following conditions are met:

* natural gas supply is available
* service for gas boilers is available

The economics are most favourable under the following circumstances:

* larger buildings (at least 20 units)
* high maintenance costs with existing electric heaters
* electric heaters in need of replacement
* good space availability for new boiler(s) and for installing the flue.

Description

Natural gas is a substantially less expensive source of energy than electricity in Ontario, even allowing for the inefficiency of the gas boiler. Conversion to gas domestic hot water heating is normally only considered in urban locations where a gas supply and competent service for gas-fired equipment are readily available.

Conventional atmospheric gas boilers have a seasonal efficiency of about 65%. Boilers, such as the VHE Weil McLain, are now available which provide better than 85% seasonal efficiency. Relative costs and savings of alternative boilers should be analyzed for any conversion.

Cost/Benefit

Typical relative energy costs of electric heat, conventional gas boilers, and so-called medium efficiency boilers are as follows:

Annual energy use 1800 kWhr/apartment/year

Electric heat at 5 cents/kWhr = $90/year

Conventional gas heat, 65% efficiency, 20 cents/cu.m. = $60/year

Medium efficiency gas heat, 85% efficiency = $45/year

Simple payback periods are generally in the range of 5-10 years.

How to Get It Done

The regional office can provide guidance on the feasibility of conversion, and can help analyze the available alternatives.

5.0 LIGHTING

5.1 Replace Incandescent Common Area Fixtures

Where It Applies

This measure applies to buildings which still have some incandescent lighting fixtures in corridors, stairwells and other common areas, and where those lights are in use for at least 6 hours each day.

Description

Incandescent lighting is very inefficient. Fluorescent fixtures produce about six times as much light as incandescent fixtures using the same amount of electricity. Therefore, replacement of incandescent lighting can provide equal or improved light levels for substantially less energy use.

Savings depend on the difference in Wattage between the existing and the replacement fixtures, and on the length of time that the fixture is in use. To obtain a five year simple payback from electricity cost savings, the following are typically the minimum necessary Wattage savings per fixture:

24 hours/day	30 Watts
12 hours/day	50 Watts
8 hours/day	70 Watts
4 hours/day	115 Watts

These figures are based on 75 percent of electricity savings from fixture conversion being seen at the meter. The remainder of the savings are assumed to be offset by longer operation of electric heaters in the common areas and the air makeup system.

Additional savings in bulb costs are normally obtained from fixture conversion. A regular incandescent bulb lasts for about 1,000 hours, while long life bulbs are generally rated for 2,500 hours. Fluorescent lamps are about double the cost of incandescent bulbs, but last up to twenty times longer. Direct savings come from reduced expenditure on light bulbs, while the time required for changing bulbs is substantially reduced.

If a building has a central battery emergency power system supplying some of the incandescent fixtures, then local battery powered emergency lights should be considered, or special fixtures used which contain incandescent bulbs for emergency use.

Cost/Benefit

The relationships between Wattage saved per fixture, hours of use and payback period are described above. Incandescent lighting fixture conversion generally provides paybacks from 2-5 years. Savings can be up to 5 percent of total electricity costs. Reduced bulb costs can add up to 50 percent to these savings.

How to Get It Done

Conversion of common area lighting is specified in detail in EC 3081-S, issued in September 1980. Assistance in identifying suitable makes and models of fixtures can be obtained from regional offices.

5.2 Shut Off Common Room Lights

Where It Applies

Keeping lights off in games rooms, laundry rooms and other common rooms when they are unoccupied applies to all buildings.

Description

Shutting off lights when a room is unoccupied is a discipline which takes time to develop. Posting notices in the buildings and labelling switches help to remind residents. The custodian should be instructed to switch lights off whenever he passes an unoccupied room. He should also arrange a regular late evening tour of the building by a dependable late-to-bed resident to make sure that all common area lights are off overnight.

Cost/Benefit

There is little or no implementation cost associated with this measure. Savings of up to 1 percent of total energy costs may be expected.

How to Get It Done

Each housing authority should develop its preferred strategy with respect to:

- o notices and switch labels
- o custodian training
- o late evening lights out building tours.

5.3 Shut Off Lights In Daylit Areas

Where It Applies

This measure potentially applies to all buildings which have daylit common areas (lobbies, stairwells, laundry rooms etc.).

Description

Electric lighting in daylit areas should be shut off during the day.

On occasion, the lights in a daylit area are on a separate circuit, in which case implementation of daytime shutoff is straight forward. If there are 200 Watts or more of lighting on a single circuit, then use of a 24 hour timeclock is recommended. For less than 200 Watts only manual control is cost justified.

If the lighting is not separately circuited, again it normally requires at least 200 Watts to justify the cost of installing a switch. At least 300 Watts is necessary to provide an acceptable payback for recircuiting and a timeclock.

Cost/Benefit

Timeclocks and recircuiting according to the minimum load guidelines described above should provide a payback of 5 years or less. Savings of up to 0.5 percent of total electricity costs may be expected.

How to Get It Done

A survey of each building is necessary to establish which fixtures can be shut off during the day, and how the circuits are arranged. A scope of work can then be defined for an electrician to make the necessary changes.

5.4 Delamp Overlit Areas

Where It Applies

This measure normally only applies to buildings which have two or four lamp fluorescent fixtures in some parts of the common areas.

Description

The potential for delamping can exist in any or all of the following areas:

	Recommended Light Levels (footcandles)
o corridors	5
o stairwells	5
o laundry rooms	30-50
o party, games rooms	30-50

Corridors should be provided with single lamp 4 foot fixtures at 5 m to 6 m centres. If 2 lamp fixtures are in use, it is likely that delamping is possible.

Stairwells generally have one 4 foot fixture on every other half landing. If more than this has been provided, then some delamping is indicated.

Common rooms (including laundries) are normally expected to have about 20 Watts per square metre of floor area. If counting the lighting Watts (including 20% for ballast losses) and dividing by the measured floor area of the room reveals a higher value than this, then the potential for delamping is again likely.

There are four possible methods of delamping:

- o Removal of fixtures involves disconnecting a redundant fixture, capping the wires and refinishing the ceiling or wall.
- o Removal of lamps can only be done with 4-lamp fixtures. Two lamps, which share one of the ballasts, are removed, and the ballast is then disconnected.
- o Installation of a phantom tube in a two lamp or four lamp fixture replaces one of two lamps sharing a ballast without the other lamp going out. The phantom tube produces no light, and reduces the power input and light output of the pair of lamps by two thirds.
- o Installation of a power reducer on the load side of the ballasts can reduce power input and light output by 25 percent, 33 percent or 50 percent. The power reducer is wired into the fixture, and both lamps remain alight but with the reduced output. The power reducer cannot be used with low wattage (F 34) lamps.

Cost/Benefit

The following are typical payback periods for a 2 lamp 4 foot fixture in use on average for 12 hours/day:

Delamping Method	Payback
Fixture removal	1 year
Lamp removal	3 months
Phantom tube	6 months
Power reducer - 25 percent	5 years
- 33 percent	4 years
- 50 percent	2.5 years

Total savings from delamping are unlikely to exceed one percent of electricity costs. All methods reduce lamp and ballasts costs, adding up

to 10 percent to the total annual electricity cost savings.

How to Get It Done

With the exception of the phantom tube, all methods require the services of an electrician. The regional office can provide advice on obtaining phantom tubes and power reducers.

5.5 Install Low Wattage Lamps and Ballasts

Where It Applies

This measure applies to all buildings.

Description

Low wattage (F 34) lamps are produced by all the major manufacturers, and should always be used in common areas unless power reducers have been employed to reduce excessive light levels.

When ballasts fail, they should be replaced by high efficiency electronic ballasts which consume less electricity, and are expected to last two and a half times as long as conventional ballasts.

Cost/Benefit

Low wattage lamps and ballasts cost more than their conventional counterparts, but recover their cost premiums several times over during their lives. Savings of up to 1 percent of total electricity costs can be expected.

5.6 Replace Incandescent In Suite Fixtures

Where It Applies

This measure applies to buildings which have in suite incandescent lighting fixtures in areas which are likely to be in use on average for ten hours/day or more.

Description

The rationale for conversion of incandescent fixtures in the apartments to fluorescent is similar to that described in Section 5.1 for common area fixture replacement. Candidate areas for conversion are:

- o kitchens
- o bathrooms

Potential savings depend on the difference in Wattage between the existing and the replacement fixture, and on the hours per day that the light is on. For 10 hours/day average use, about 50 Watts savings are required to justify the cost of conversion.

Cost/Benefit

Provided that Wattage savings exceed the minimum outline above, payback periods due to replacement of in suite incandescent fixtures will be 5 years or less. Savings of up to 5 percent of total annual electricity costs can be expected.

How to Get It Done

Conversion of in suite lighting is specified in detail in EC 3083-S, issued in July 1982 and revised in February 1983. Assistance in identifying suitable fixtures can be obtained from regional offices.

6.0 OTHER SYSTEMS

6.1 Car Plug-Ins

Where It Applies

This measure applies to buildings which have plug-ins for cars in their parking lots.

Description

Car plug-ins are provided in the parking lots of buildings in the northerly parts of Ontario to supply power to car engine block heaters. Buildings in the south of the province do not have plug-ins, and there is no need to make them available for car vacuuming or any purpose other than the block heaters.

Car manufacturers advise that use of block heaters is unnecessary above -10 C (14 F) for engines in good working condition. Most winter hours are above this temperature throughout the province. Installing a thermostat to automatically shut off the power supply to the plug-ins when the outdoor temperature reaches -10 C (14 F) can save half or more of their electricity use.

In a few buildings it has been reported that some outdoor lighting is wired into the same electrical circuits as the plug-ins. Where this condition exists, it should be corrected, if possible, to separate lighting and plug-in circuits. If this is not economically feasible, then the thermostat should be wired to operate only during the day when the lights are off.

Cost Benefit

According to test installations in two OHC senior citizens' parking lots conducted in 1979, at least ten cars using plug-ins are necessary in

a parking lot to justify the cost of thermostatic control within a five year payback. The average savings were 450 kiloWatt hours for each plug-in, worth $22.50 at 5 cents per kiloWatt hour.

How to Get It Done

An electrician is needed to install the thermostatic controller, and to make the necessary wiring changes.

The measure is described in greater detail in EC 3082-G issued in June 1981.

6.2 Convert From Flat Rate To Metered Water Billing

Where It Applies

This measure applies to all buildings which pay for water use on a flat rate basis rather than according to actual metered consumption.

Description

In June 1984, a report was prepared for OHC which analyzed water cost and use data for all buildings. Average water costs for 1982/83 in senior citizens' buildings were identified as:

- o buildings with water meters $44/apt/year
- o buildings with flat rate billings $114/apt/year

The reason for the considerable difference appears to be that utilities charge for flat rate water use based on normal consumption levels for family units, which use far more water than do seniors' apartments. Installation of a water meter, and conversion to metered billing, can save well over half of a building's water costs.

Cost/Benefit

The cost of installing the water meter is determined through discussion with the local utility, and can range from a few hundred to a few thousand dollars. Savings vary, but can be very large. A 15 unit building in Hagersville converted to metered billing in early 1985, and saved $3,500/year or $230/unit.

Any building under flat rate billing in 1985/86 should investigate the costs and potential savings of conversion.

How To Get It Done

The local water utility will advise on the availability of metered

service, and on the cost of conversion. The regional office can help with estimation of potential water cost savings.

D. CUSTODIAN CHECKLIST

ONTARIO HOUSING CORPORATION

SENIOR CITIZENS' LOW-RISE BUILDINGS

ENERGY MANAGEMENT CHECKLIST

October

- o Check corridor fan timeclock setting ___
- o Shut down seasonal exhaust fans for the winter ___
- o Check exhaust fan timeclock settings ___
- o Switch on common area heaters at breaker panels as late as possible ___
- o Check domestic hot water recirculation pump timeclock settings ___

November

- o Switch on car plug-ins as late as possible ___
- o Switch on common area heaters at breaker panels as late as possible ___
- o Check corridor fan timeclock settings ___
- o Check exhaust fan timeclock settings ___
- o Check domestic hot water recirculation pump timeclock setting ___

December

- o Check for leaking taps and toilet tanks ___
- o Check corridor fan timeclock settings ___
- o Check exhaust fan timeclock settings ___
- o Check domestic hot water recirculation pump timeclock settings ___

January

- o Check corridor fan timeclock settings ___
- o Check exhaust fan timeclock settings ___
- o Check domestic hot water recirculation pump timeclock settings ___

February

- o Check corridor fan timeclock settings ___
- o Check exhaust fan timeclock settings ___
- o Check domestic hot water recirculation pump timeclock settings ___

March

- o Check for leaking taps and toilet tanks ___
- o Switch off common area heaters at breaker panels as early as possible ___
- o Switch off car plug-ins as early as possible ___
- o Check corridor fan timeclock settings ___
- o Check exhaust fan timeclock settings ___
- o Check domestic hot water recirculation pump timeclock settings ___

April

- o Switch off common area heaters at breaker panels as early as possible ___
- o Check corridor fan timeclock settings ___
- o Check exhaust fan timeclock settings ___
- o Check domestic hot water recirculation pump timeclock settings ___

May

- o Restart seasonal exhaust fans for the summer ___
- o Check corridor fan timeclock settings ___
- o Check exhaust fan timeclock settings ___
- o Check domestic hot water recirculation pump timeclock settings ___
- o Ensure that all common area heaters are off at breaker panels ___

June

- o Check for leaking taps and toilet tanks ___
- o Shut off the heaters in the corridor makeup unit at the breaker panel as early as possible ___
- o Check domestic hot water recirculation pump timeclock settings ___

July

- o Check domestic hot water recirculation pump timeclock settings ___

August

- o Check domestic hot water recirculation pump timeclock settings ___

September

- o Switch on the heaters in the corridor makeup unit at the breaker panel as late as possible ___
- o Check for leaking taps and toilet tanks ___
- o Check domestic hot water recirculation pump timeclock settings ___

Building _____

CUSTODIAN'S ENERGY CHECKLIST AND ACTIVITY LOG

Period _____

WINTER

Date	Day	°C	Open Windows N/E	Open Windows S/W	Open Doors N/E	Open Doors S/W	Common Area Inspection			Corridors Temp. Up	Corridors Temp. Down	DHW °C	Date	Day	°C	Open Windows N/E	Open Windows S/W	Open Doors N/E	Open Doors S/W	Common Area Inspection			Corridors Temp. Up	Corridors Temp. Down	DHW °C
Week 1													Week 5												
Week 2													Week 6												
Week 3													Week 7												
Week 4													Week 8												

COMMENTS

COMMENTS

ONTARIO HOUSING CORPORATION

SENIOR CITIZENS' LOW-RISE BUILDINGS

ENERGY MANAGEMENT

ACTIVITY LOG-WINTER

How Often?

Complete the log three times a week. Each log sheet has space for two months. Write the month at the top of the first column, write the date and the day of the week alongside each row of information.

Outdoor Temperature

Read and write down the outdoor temperature.

Open Windows and Doors

Walk around the building. Count and write down the number of open apartment windows and balcony doors facing in each direction (North or East; South or West).

Common Area Inspection

Common areas include corridors, stairwells, laundry rooms, games rooms and all other parts of the building except the apartments. Make regular tours of the building in winter - these small things add up to a lot of dollars.

Make sure windows are closed. Record the number which you find open.

Make sure thermostats on heaters are set at minimum. Write down the number which you find turned up.

Shut off lights in unused or well daylit areas. Write down how many areas have lights left burning unnecessarily.

Corridor Temperatures

Read and write down the space temperature in the main floor corridor and (if you have one) in the upper floor corridor.

DHW

Read and write down the temperature showing on the thermometer in the domestic hot water supply pipe.

Comments

Write down any problems or unusual situations which occur during the month that are likely to affect energy use. This record will be very valuable in future when problems need to be tracked down.

BUILDING

_____

CUSTODIAN'S ENERGY CHECKLIST AND ACTIVITY LOG

YEAR

_____

SUMMER

	JUNE		Common Area	DHW	JULY		Common Area	DHW	AUGUST		Common Area	DHW	SEPTEMBER		Common Area	DHW
	Date	Day		°C	Date	Day		°C	Date	Day		°C	Date	Day		°C
Week 1																
Week 2																
Week 3																
Week 4																

COMMENTS	COMMENTS	COMMENTS	COMMENTS

ONTARIO HOUSING CORPORATION

SENIOR CITIZENS' LOW-RISE BUILDINGS

ENERGY MANAGEMENT

ACTIVITY LOG-SUMMER

How Often?

Complete the log three times a week. The log sheet has space for all four summer months. Write the date and the day of the week alongside each row of information.

Common Area

Shut off lights in unused or well daylit areas. Write down how many areas have lights left burning unnecessarily.

DHW

Read and write down the temperature showing on the thermometer in the domestic hot water supply pipe.